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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional): F125

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on July 30, 2007

Signature: David Griner

Typed or printed name: David Griner

Application Number	Filed
10/758,966	January 16, 2004

First Named Inventor: Diane K. Stewart

Art Unit	Examiner
1763	Allan W. Olsen

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

- [ ] applicant/inventor.
- [ ] assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)
- [x] attorney or agent of record. Registration number 47,614
- [ ] attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____

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NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

- [ ] *Total of _____ forms are submitted.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.: 10/758,966 **ART UNIT:** 1763

INVENTORS: Diane K. Stewart, J. David Casey, Jr., John Beaty, Christian R. Musil, Steven Berger and Sybren J. Sijbrandij

FILING DATE: 01/16/2004 **EXAMINER:** Allan W. Olsen

TITLE: Electron Beam Processing for Mask Repair

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Arguments in Support of Pre-Appeal Brief Request for Review

All of the pending claims in Applicants' invention (1-12 and 21-22) are for methods of restoring the transparency of a stained substrate by directing an electron beam towards the implanted substrate in the presence of an etching gas. Claims 1-12 are specifically directed at "a quartz material having implanted gallium that reduces the transmission of the quartz material," while claims 21-22 are directed at a transparent substrate having an implanted material that reduces the transmission of the substrate." Claims 1-12 require that the transmission of the quartz material be substantially increased while the thickness of the quartz material is substantially unchanged, claims 21 and 22 require that the thickness of the quartz material be reduced by less than 5 nm.

All of Applicants' claims stand rejected as anticipated by Musil or by Stewart. Obviousness under § 103(a) is not at issue because the subject matter of Musil, Stewart, and the claimed invention were, at the time the claimed invention was made, owned by FEI Company, the assignee of the present invention.

All of Applicants' claims contain limitations that are simply not taught by the references. Obviously, section 102 anticipation requires that a single reference must disclose each and every element or step of the rejected claim. The Examiner has committed a clear legal error by rejecting Applicants' claims even though all of the limitations are not taught by the references.

The Musil Reference

Instead of a method of restoring the transmission of a quartz-implanted substrate like the one described and claimed by Applicants, the Musil reference teaches methods of removing opaque defects on top of a quartz substrate. Musil teaches electron beam etching instead of ion beam

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David Griner

etching so that the defect can be removed without damaging the quartz substrate. Although the Musil reference does teach one method where gallium may be implanted into the quartz substrate, Musil does not teach any method at all for restoring or even improving the transmission of this implanted quartz substrate.[1] Instead of a defect that is repaired, this gallium implantation is the result of the opaque defect removal taught by Musil. Thus, Musil does not teach "restoring the transparency of a quartz material having implanted gallium" or "restoring the transparency of a transparent substrate having an implanted material" as required by Applicants' claims.

In the response to Applicant's original argument on this point, the Examiner stated "Further, the examiner considers a metal coated quartz substrate to be opaque (i.e., non-transparent). Therefore a process that repairs an opaque defect on a quartz substrate is considered to be a process that restores transparency to the quartz substrate." While Applicants recognize that during patent examination, pending claims must be given their broadest reasonable interpretation consistent with the specification, the Examiner's interpretation is both unreasonable and inconsistent with the plain language in the claims and Applicants' specification. Removing an opaque defect may affect the transparency of the photomask; however it does not increase the transmission of the quartz material as required by Applicants' claims. The Examiner is not allowed to ignore the plain language in the claims, and Applicants' claims 1-12 specifically require that the transmission of the quartz material itself be increased. Further, the Examiner's interpretation is completely inconsistent with Applicants' Specification, which makes it absolutely clear that Applicants' claims are directed at increasing the transmission of the quartz-implanted material itself, rather than increasing overall transmission by milling away opaque material covering the quartz-implanted material.

Applicants also note that the rejected claims all require that the transmission of the substrate material be substantially increased and that the thickness of the substrate material is substantially unchanged (or decreased less than 5 nm). Both elements are required. If the Examiner includes the opaque defect material for one limitation, it must also be included for the other. If a non-transparent quartz substrate with implanted ions is considered to be the same as a non-implanted

[1] Much of the Examiner's most recent office communication is directed at showing that Musil does not teach removal of gallium-implanted quartz material. In Applicants' Response of May 29, 2007, Applicants understood the Examiner to be arguing that both Stewart and Musil taught the repair of implanted quartz by removing the implanted material. Applicants intended to argue that even if that was the case, Applicants claims were not anticipated because the removal of the implanted material meant that the thickness of the quartz material would not be substantially unchanged. While Stewart does teach that electron beam etching can be used to repair a gallium-implanted layer, that layer is repaired by removing the implanted material and thus changing the thickness of the material. Applicants agree that Musil does not teach any etching of the quartz material whatsoever.

quartz substrate with an opaque defect on top for the purposes of improving transmission, it would have to be the same for the limitation requiring that the thickness remain unchanged. Because the opaque portion of the substrate (quartz layer plus defect) is etched away, Musil does not teach improving the transmission of a substrate while the substrate thickness is substantially unchanged.

This is especially evident in claims 21 and 22, which are expressly directed at the transparency of a substrate (rather than a quartz material as in claims 1-12). Thus, if the Examiner considers the etching away an opaque defect as in Musil to be increasing the transparency of a substrate, claims 21 and 22 would be anticipated only if the thickness of the substrate (which includes the defect) is necessarily decreased less than 5 nm when the opaque defect is removed.

Also, even if the Examiner's interpretation of restoring transmission is accepted, Musil fails to teach "directing an electron beam towards the gallium implanted portion of the quartz material" as required by Applicants' claims. As admitted by the Examiner in the most recent Office communication of June 19, 2007, Musil teaches removing the last 20-40 nm of the opaque defect with an electron beam but "**[t]his electron beam etching does not etch the transparent quartz substrate.**" (emphasis in original). This is because Musil teaches directing the gas and the electron beam at the defect material, not at the quartz substrate. In fact, it is possible that the transmission of the photomask in Musil could substantially increased without the electron beam or the gas even coming into contact with the implanted quartz layer.

Further, Musil does not teach an embodiment where the quartz substrate is necessarily implanted with gallium ions. At most, Musil teaches an embodiment where the quartz substrate may have been implanted with Ga+ ions. Musil expressly states that "By leaving approximately that thickness of material unetched by the ion beam and then using the electron beam to remove the remaining material, little or no gallium will be implanted into the mask itself." In other words, there is a possibility that some gallium will be implanted, but also a possibility that no gallium at all will be implanted.

Anticipation under § 102 requires that each and every element as set forth in the rejected claim be present in the reference, either expressly or inherently. The Examiner correctly notes that only one embodiment must inherently possess the required feature, but where none of the embodiments necessarily includes the claim limitation, it cannot be inherent in the reference. The particular embodiment at issue in Musil is a method of repairing opaque defects that includes an ion milling step. The reference itself expressly states that using that method, ion implantation may or may not occur. The language in Musil's paragraph [0048] may make obvious an embodiment where

gallium is necessarily implanted into the quartz, but that is simply not good enough for anticipation under § 102. Instead, the Examiner is actually applying the standard for § 103 obviousness and simply calling it anticipation.

Applicants also note that the Examiner stated in the most recent office communication "where functional language is used in a process, the burden shifts to applicant to establish that the reference does not inherently function in the manner required by the claims." While Applicants do not believe this to be a correct interpretation of the case law cited by the Examiner, the point is moot because the limitation at issue ("directing an electron beam towards the gallium implanted portion of the quartz material") is not a functional limitation.

The Stewart reference

The Stewart reference also fails to anticipate any of Applicant's claims. While Stewart does address restoring the transmission of gallium-implanted quartz layer, the layer is repaired by removing the implanted quartz using electron beam assisted etching. Obviously, removal of the gallium-implanted quartz would substantially change the thickness of the layer. Nowhere does Stewart mention increasing the transmission of the implanted quartz material without substantially changing the thickness of the layer or by etching the substrate less than 5 nm. In fact, in each of the office actions in this case, the Examiner has actually quoted language in Stewart making it clear that the transmission is restored by removing the implanted quartz material. The Examiner has maintained the anticipation rejection based upon Stewart despite the fact that the quoted language clearly shows that not only does Stewart fail to teach the limitation, the reference actually teaches the opposite.

Dependent Claims 2-12

Finally, Applicants note that the Examiner has made almost no explanation as to how Musil or Stewart anticipates dependent claims 2-12. All of the office communications to date simply restate the Examiner's conclusion that "Musil teaches repairing opaque defects of a lithography mask by directing an electron beam and XeF_2 toward a region of a quartz substrate into which Ga+ ions have been implanted." The Examiner then points out that Stewart incorporates Musil by reference and quotes language from Stewart that teaches using electron beam etching to remove a gallium-implanted quartz layer (thus decreasing the thickness of the entire quartz layer). Several of Applicants dependent claims contain limitations not found in either of the cited references.

For example, claim 4 requires that the "the transmission is increased to greater than 80% of the transmission of the quartz material without implanted gallium." Claims 5, 9, and 21 require that the transmission be increased to greater than 90% of the transmission of the quartz material (or substrate) without implanted gallium. Even if removing an opaque defect satisfies the requirement of increasing transmission of the quartz layer, the transmission could only be increased to the transmission level of implanted quartz because Musil does not teach any method at all for repairing the implanted quartz layer. Stewart does teach increasing the transmission of a quartz substrate, but the method taught by Stewart is to etch away the implanted quartz (which would decrease the thickness of the quartz material contrary to the limitations in Applicant's claims).

Further, claims 10-12 contain limitations describing the electron beam dose to be provided to the implanted quartz material. Again, these limitations are simply not found in the references. For claims 10-12, the Examiner does make the statement that because Musil obtains results that meet the result-limitations in the claims, it follows that "comparable" operation parameters were used in Musil. First, Applicants note that Musil does not achieve the same results as the methods in the rejected claims. Musil teaches a method of removing an opaque defect on top of a quartz layer. The claims at issue are directed at increasing the transmission of implanted quartz. Even if both are considered to be methods of increasing quartz transmission, they are still different repair methods directed at different types of defects. Further, "comparable" limitations are simply not enough to establish § 102 anticipation.

Applicants submit the Examiner has not established a prima facie case of anticipation since the cited references do not teach or suggest all of the limitations in rejected claims 1-12 and 21-22 and requests that the reviewers withdraw the rejections.

Respectfully submitted,

7/30/07
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